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General

Thank you for purchasing INSIGHT (Fetal Monitor). For safety, stable performance and follow-up management, please read this service manual before using the device.

Before use, please read the service manual until you completely understand basic device functions & usages, maintenance methods and etc so that you can be ensured of safe use of the device and long-term stable performances.

We, Medical ECONET GmbH, provide you with reliable products only.

● Assembly, extension, modification, repair and etc of the device should be done by the person qualified by us.

● Electric installation site and etc should be selected in accordance with relevant regulations.

● Use the device as directed in the User’s Manual.

This device should be used under supervision of a person who is medically license.

This device is used to assess the fetus’s status.

For the mother’s safety, do not use any part or accessory other than recommended by us.

If any device not specified in the User’s Manual of this device is used, such device shall be notified to us or any of our distributors who are authorized of selling our products.

Warranty Term

● This product is made through strict quality management and test process. This product can be repaired, replaced or refunded in accordance with " Consumer' s Damage Compensation Regulation" noticed by Economic Planning Board.

● This product is warranted for 1 year.

● If broken while being used normally, this product will be freely repaired by our service center for such warranty period.

● If you find any problem on the device, please let us know the model name, device number, purchasing date and breakage content.

Service Request

The service for Medical ECONET GmbH products can be carried out by only Medical ECONET GmbH Customer Service Dept or the person certified of such service by Medical ECONET GmbH. If the device is repaired or tried to be repaired by any person other than such certified person for the warranty period, the warranty period shall be void.

Medical ECONET GmbH Customer Service Dept or any distributor certified of Medical ECONET GmbH Product Service is obligated to carry out any service requested by the user.

If you find any problem on the device or any risk on the human body in any hospital and place where the device is used, the maintenance/repair work shall be promptly and fully taken.

If you find any problem on the device, take the actions as follow:

- Please immediately contact our Customer Service Dept or any distributor representing us for our service. Check the model name, product number, purchasing date, problem or question to ask before contacting us.
- Our Customer Service Dept will check and solve the problem online first. If difficult to solve the problem online, it will visit you to solve the problem immediately.

How to Contact us

Please contact us at the following number to get various kinds of service, product information and etc and to talk to the person in charge of sales.
Medical ECONET GmbH service is always open to you. Please contact us at the number as follows:

Top Distributor in Germany

medical ECONET GmbH Tel: +49 (0)2365 92437-15

* Before making reservation on troubleshooting, please check the model name, serial number, purchasing date and abnormality of the damaged product.

Chapter 1

How to use the user's manual

1.1 General

- This device provides you with the exact and stable values (fetus' s heart rate, patient' s uterus shrinking level and etc) measured on the patient and fetus and correct information of the fetus' s status.
- This manual covers INSIGHT, a Fetal Monitor manufactured by Medical ECONET GmbH, which is designed for maximal user' s convenience. This manual consists of independent chapters. Some information is specified several times here in this manual.
- This manual is a guidebook for efficient use of INSIGHT. For clinical and pathological information about the device, please refer to basic relevant medical books. Then, you will use the function of the device better. If you refer to clinical books together with this manual, you will expect more effects from using the device.
- If you find any Problem while using, please contact us or our A/S Reservation Office.

1.2 Contents

- The user must read the User' s Manual before using the device.
- This manual consists of the chapters as follow:

Chapter 1. How to use the User' s Manual

Chapter 2. Precautions for Use

Chapter 3. Overview of INSIGHT

Chapter 4. How to install INSIGHT

Chapter 5. Description of INSIGHT Main Body

Chapter 6. Troubleshooting

Chapter 7. Specification

1.3 Meaning of Symbols in the User's Manual

● We have marked on the user manual to emphasize the following agreements. The user must follow all warnings and remarks.

● In case of improper use or poor maintenance on the equipment resulting in product defect, neither the manufacturer nor the distributor will be responsible for any damages.

Warning
" WARNING" is used to notify the possibility of critical injury, death, and physical and financial damage in case the warning is ignored

Precaution
" PRECAUTION" is used to notify the possibility of non-critical injury in case the notice is ignored

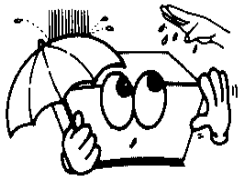
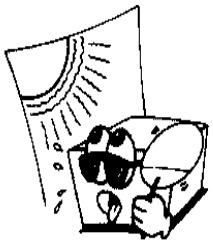
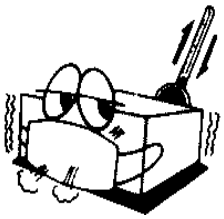
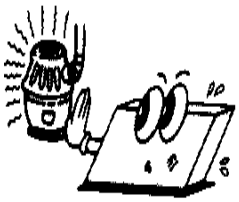
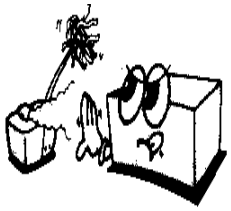
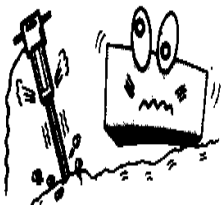
NOTE
" Note" is used to notify users of not dangerous but very important information regarding equipment installation, usage, and maintenance

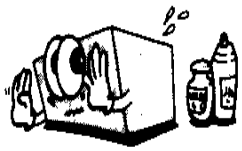
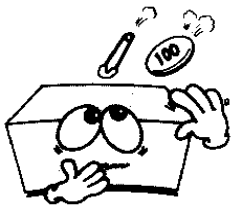
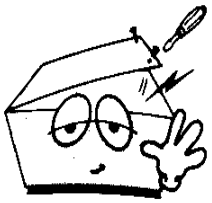
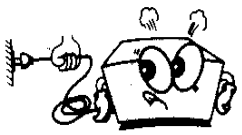
Chapter 2

Precautions for Use

2.1 Precautions of Using-Environment

■ Avoid using or storing the device under the environments as follow:

	Keep it away from wet place or do not use it by wet hands.		Keep it away from direct sunlight.
	Avoid areas that have high fluctuations in temperature. (Temperature Range for Use: 10°C ~ 45°C, Humidity: 30% ~ 85%)		Keep it away from any electric heater.
	Avoid areas of high humidity or ventilation problems		Avoid areas susceptible to large shock or vibration

	Avoid areas near chemicals or explosive gas		Make sure to not let any dirt or especially metallic objects from going inside the equipment
	Do not disassemble it. We WILL NOT be responsible under any circumstances in this case.		Do not power it on before completely installed. Otherwise, it may be damaged.
	Hold the plug to withdraw the power cord.		Do not submerge the probe for 5 hours or longer.

Basic environments for use are as follow:

- Temp : 10℃ ~ 45℃
- Pressure : 70 ~ 106 KPa
- Humidity : 30% ~ 85%

Basic environments for storage are as follow:

- Temp : -10℃ ~ 40℃
- Pressure : 70 ~ 106KPa
- Humidity : 20% ~ 95%

2.2 Precautions for Electric Safety

Before using the device, please check the items as follow:

- Is the power supply line of the device proper? (100 – 240VAc)?
- Is every connection part (power line or any optional device) connected to the device properly?
- Is the device completely grounded?
  (Otherwise, noise may be made.)
- Is every accessory that measures the parameters to the device correctly before powered on?

NOTE
To avoid electrical noise while using, install the device away from generators, X-ray devices, broadcasting devices, mobile wires and etc. Otherwise, inaccurate result may come out. INSIGHT requires a separate power circuit and stable ground. Inaccurate result may come out in case power is shared with another electronic device.

NOTE
INSIGHT is classified as follows: - This device is I type-CF grade device in terms of electric shock. - It is improper to use this device nearby inflammable anesthetic and solvent. - IEC/EN 60601-1 (Safety of Electric Medical Equipment) based noise making is A class. IEC/EN 60601-1-2 (Electromagnetic Compatibility Requirements) based noise proof is B level.

2.3 Maintenance and Cleanness

You can maintain cleanliness on INSIGHT and its accessories (including the probe) in various ways. Use the method recommended below to avoid damage or contamination on the equipment.

If you use any of materials that can damage the product (non-approved material), the warranty will be voided.

Precaution!

After cleaning the device, check the main body and the sensors very carefully.

If the device is deteriorated and damaged, do not use it.

Using warm water, clean the main body with alcohol on a soft cloth at least once a month, and do not use lacquer, thinner, ethylene, and acidic cleansers. These materials can damage the device.

The cable and accessories must be maintained to avoid contact with dirt and wiped down with warm water (approximately 40℃/104°F) on a cloth pad, and use alcohol to clean it once a week.

Do not dip any of accessories in liquid or detergent. Also, no liquid must go in the device or accessories.

Warning!

Do not dip any of accessories in liquid or detergent. Also, no liquid must go in the device or accessories.

Chapter 3

Overview of INSIGHT

3.1 Principle and Features of INSIGHT

INSIGHT is a Fetal Monitor, which basically measures the fetus’s heart rate and the patient’s uterus shrinkage. INSIGHT sends supersonic signal to the patient’s abdomen and then measures the signal returned from the fetus’s heart. It then sorts out the Doppler frequency from the returned signal and converts it into the heart beat of the fetus. The signal is then analyzed and displayed as the fetus’s heartbeat and printed out on a printer. The fetus’s heartbeat can be measured during the labor with the FECG electrode, and the patient’s contraction level of uterus can be measured with pressure sensors, as well as printing out the data to inform the level of her labor pain and frequency. INSIGHT displays various signals on the LCD and the adjustments and values of the signals can easily be controlled with simple key controls. INSIGHT is capable of measuring twin fetus, and supports an optional Ethernet controlled central monitoring system and supports an optional AST probe.

3.2 Composition

Basic Accessories

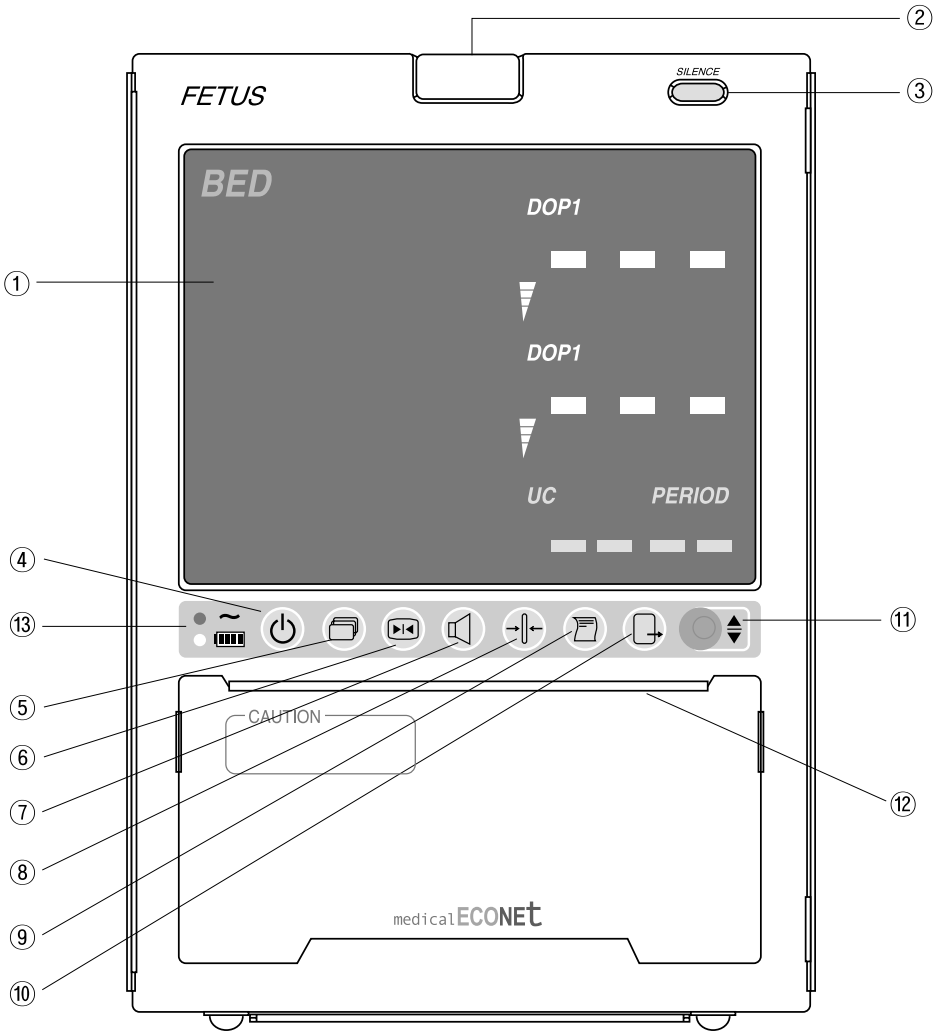
- Ultrasonic Probe (1EA)
- UC Probe (1EA)
- Event Mark Jack
- Printer Paper (1EA)
- Power Cord (1EA)
- User’s Manual (1 Book)
- Ultrasonic Gel (1EA)
- Belt for Probe Fixation (3EA)

Options

- FECG Probe
- Central Monitoring Device Cable/Communication Program
- Cart
- AST Probe

3.3 Parts

▣ Front Face & Control Panel



(1) 7” LCD Panel (2) Alarm & HR beat LED Lamp

(3) Alarm On/Off Key (4) S/W Power Key

(5) Multi-Screen Key (6) Freeze Key

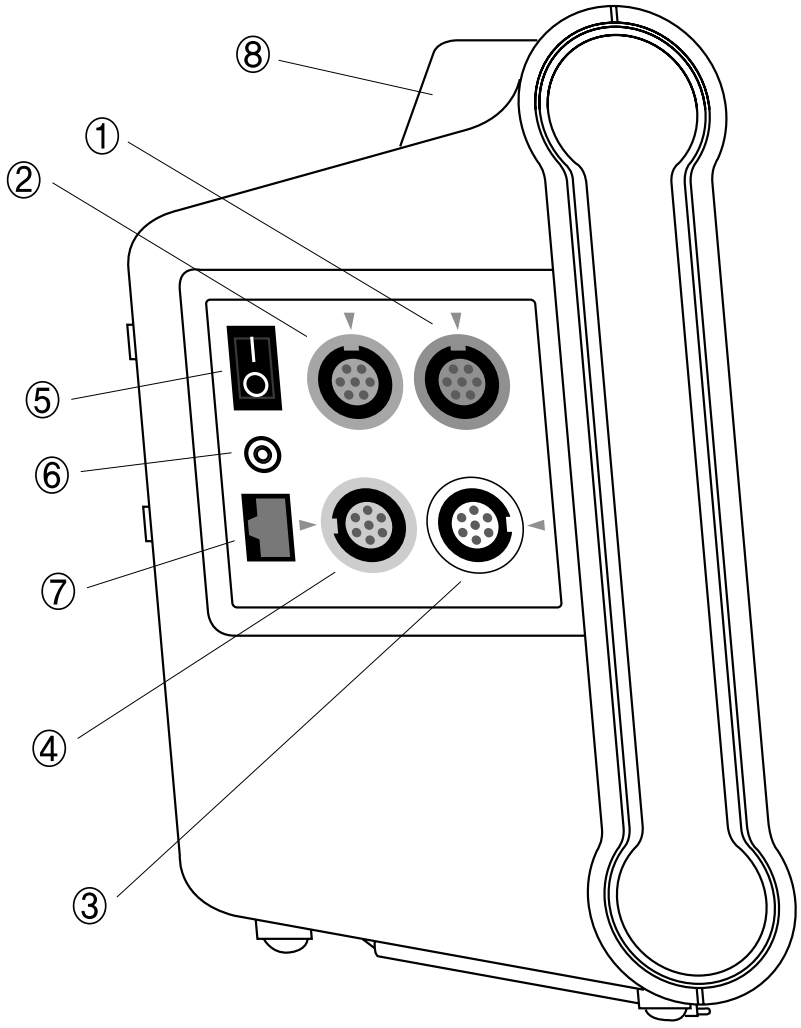
(7) Volume Key (8) UC Reference Key

(9) Printer Key (10) ESC KEY

(11) Encoder (or Rotary) Switch (12) 4" Printer

(13) A/C & Battery Power LED

▣ Left Face



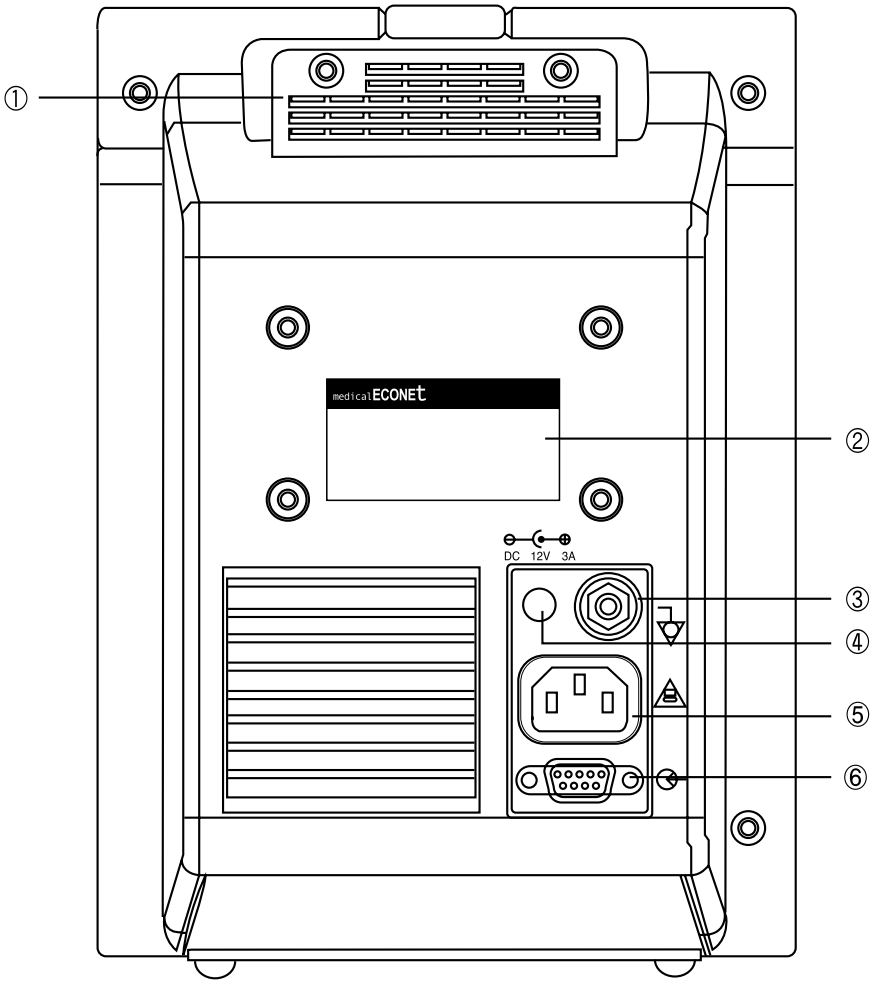
(1) DOP1 Probe Connection Part (2) DOP2 Probe Connection Part

(3) UC Probe Connection Part (4) FECG Probe Connection Part

(5) AC Power Switch (6) Mark Jack Connection Part

(7) Ethernet Connection Part (8) Handle for Carriage

▣ Rear Side



(1) Handle for Carriage (2) ID Label

(3) Adapter Power Connection Part (4) Ground Terminal

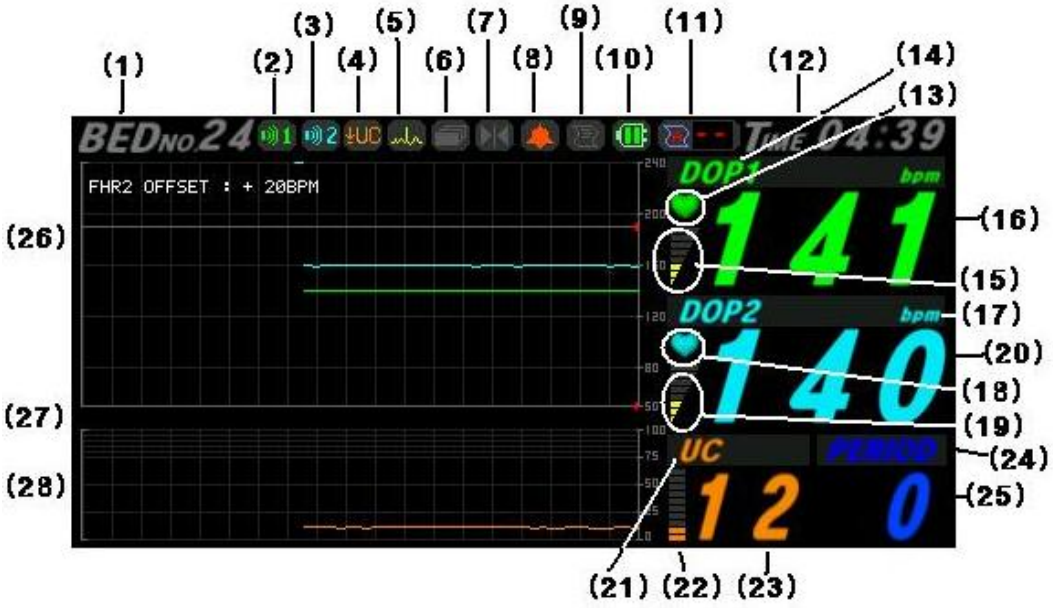
(5) AC Power Connection Part (6) RS-232C Cable Connection Part

Warning!

Do not disassemble the device. Otherwise, you may be electrically shocked. The device shall not be disassembled by other than the person qualified for our product service.

3.4 Description of Symbols

3.5 Initial Screen



(1) Displays the sick-bed name.

(2) Displays ID check result on DOP1 Probe.

(3) Displays ID check result on DOP2 Probe.

(4) Displays ID check result on UC Probe.

(5) Displays ID check result on FECG Probe.

(6) Displays that the screen is not the basic screen but the multi-screen.

(7) Displays that it is frozen against FHR and UC signal.

(8) Displays 3-step alarm on/off status: Alarm Operation, Alarm-Temporarily-Stopped and Alarm-Stopped.

(9) Displays the printing status.

(10) Indicates AC Power or Battery Power using status; and displays the charging voltage level of Battery.

(11) Displays the Printing Cycle for Printer Auto-Printing; and indicates the remaining time while printing.

(12) Displays the current time.

(13) Displays that FHR (Fetus Heart Rate) I is input by Doppler Probe I.

(14) Heart Rate Rhythm of FHR 1

(15) Volume Level of FHR 1, which is displayed by 8 steps

(16) BMP Value of FHR 1

(17) Probe selected for FHR 2 (DOP 2 or FECG)

(18) Heart Rate Rhythm of FHR 2

(19) Volume Level of FHR 2, which is displayed by 8 steps

(20) BMP Value of FHR 2

(21) UC Area

(22) Bar Graph of Measured UC Value

(23) Measured UC Value

(24) Uterus Shrinkage Cycle Area of UC

(25) Uterus Shrinkage Cycle of UC

(26) Graph Area of FHR 1 (DOP1) and FHR2 (DOP2, FECG)

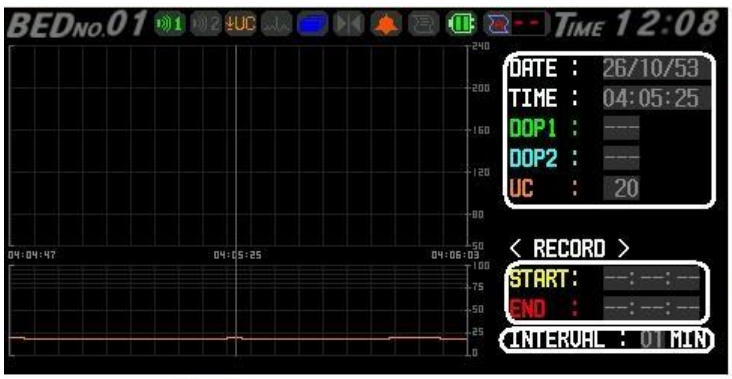
(27) Graph Area of Mark Jack

(28) Graph Area of UC

3.6 Multi-Screen

INSIGHT has three screens to provide the most comfortable and user friendly operating screen to the user. They are the Basic Screen which has the graph area, the trend screen which shows the data on a 24 hour and 1 minute interval, and the numerical value screen that displays numerical values without the graphs.

<Trend Screen>



If you press the " Multi-Screen" key once on the Basic Screen it switches to Trend Screen.

The Trend Screen has 24 hours worth of data displayed on the screen. It has a marking line that you can use to control the Encoder either left or right to confirm the data on DOP1, DOP2, FECG, and UC for each hour. The corresponding values are displayed on the right side of the screen.

You can print a certain area of the Trend Screen. Move Encoder key left/rightward to select the area you wish to print and then press once at the printing start point, and adjust it to the printing end point and press it one more time. Then, print-area will be set. You can not enter the menu in this case and it is only possible to set the print work by Encoder key. Press the " Print" key to print the area once you have set the desired area. This information is displayed on the right side of the Trend Screen.

When spinning Encoder key left/rightward, the moving interval of standard line can be set through the menu.

<Numerical Value Display Screen>

Press the " Multi-Screen" key to switch over to the Numerical Value screen. Press the " Multi-Screen" on the numerical value screen to switch over to the basic graph screen.

The numerical value screen displays the FHR1 (DOP1), FHR2 (DOP2, FECG), and the UC values. If AST probe is connected to FHR2, " AST" will be displayed instead of value. It also shows the heartbeat and the volume level for each corresponding values. The bar graph on the UC value is also shown. At the bottom of the screen, the upper and lower limits of the alarm set through the menu are displayed.

Chapter 4

How to Install INSIGHT

4.1 Precaution for Installation

Precautions for Installation of INSIGHT:

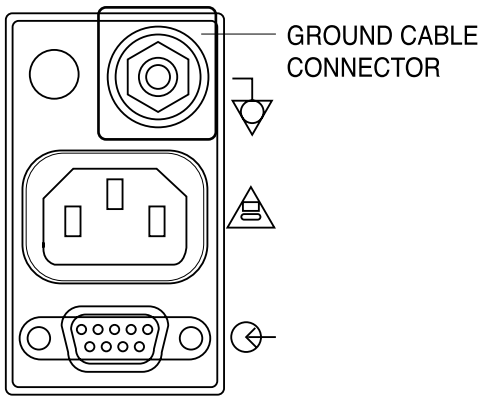
- INSIGHT shall be used at the ambient temperature of 10℃～40℃ and humidity of 30% ～ 85%.
- Check the connection status of Power Cord.
- Do not plug various cords into an electric consent.
- Place the main body on flat place.
- Ground it. (Otherwise, noise may be made).
- Do not use an electric cord that may generate noise.
- Probe may be damaged by impact. Do not get the Probe externally impacted nor submerge it in water or oil
- If Supersonic Probe used, it must be used with Supersonic Gel. After use, wash it clearly and store it.
- Install it considering the ambient temperature and humidity. Keep it away from dusty or inflammable substances.
- All configuration settings are stored in the internal memory even after the device is powered off and then turned back on. However, if the device has not been used for over ten years or an electrical/external shock is applied to it, the stored data may be altered, and you must reconfigure the information.

4.2 Installation of Main Body

INSIGHT is designed to be easily used on a normal table, cart, or any other appliances commonly found in a hospital environment. Normally, you can use the handle in the back of the device and place it on a flat surface. Since the center of gravity of the device is low, key manipulation on the device will not topple it over. It also does not slip. The LCD screen is designed to accommodate for comfortable viewing by the user. In other words, the INSIGHT does not require any other extra fastening device to use it.

4.3 Cable Connection

1) Power Connection



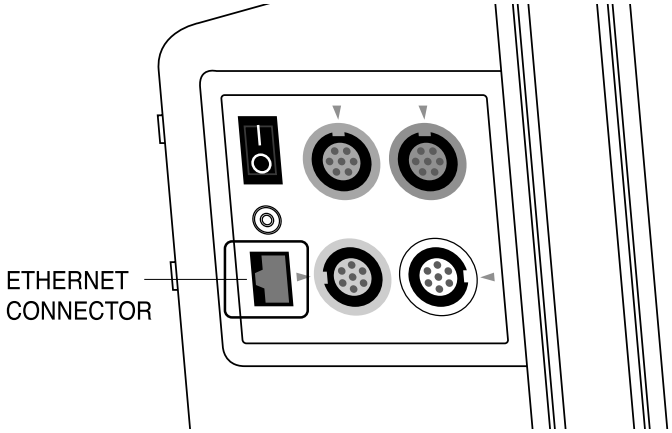
Stick the Power Cable into INSIGHT Power Connection Terminal and change the Power Switch of the left face into " On" status. Then, press the Power Switch on the front face for 1~2 seconds and the device will be powered on. In case you cannot use the device by cable power connection, use an adapter that supplies DC Power externally. It is recommended to use an adapter of which output power is DC 15V/3Amp.

NOTE!
It is recommended to use a power cable rather than an adapter. This device's accessory package does not contain an adapter of DC15V/3Amp.

2) Connection between Main Body and Probe

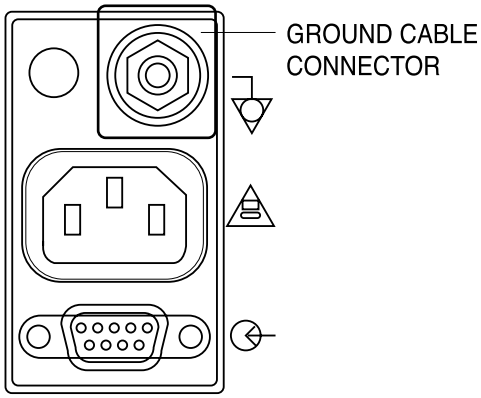
- Connect the probe desired to be measured to the connection terminal part on the left face of the main body.

- If not properly connected, problem may occur.



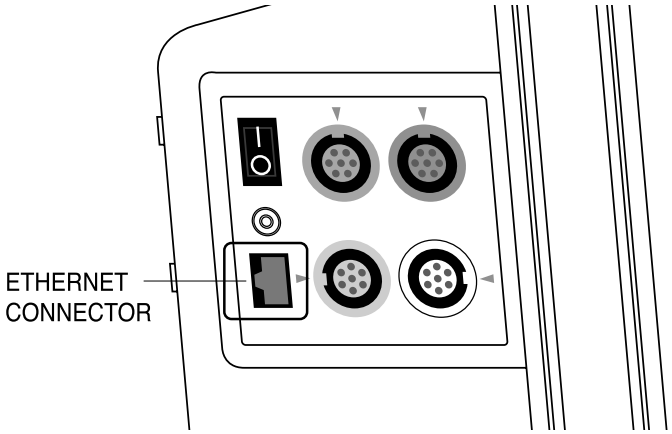
3) Ground Cable Connection

Connect the Ground Terminal of the main body with the Ground Terminal of the installation place.



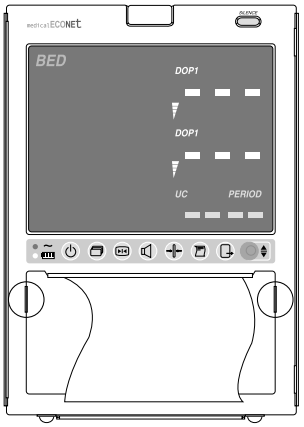
4) Ethernet Cable Connection (Optional)

Connect the Ethernet Connection Part of the main body with the Ethernet Terminal of the installation place.

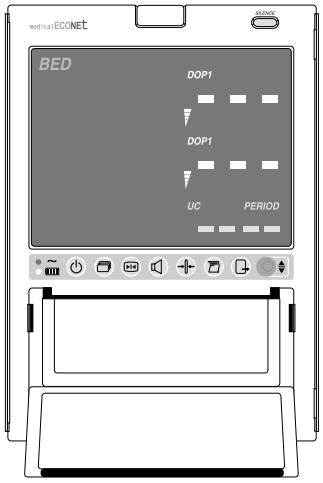


4.4 Printer Paper Loading

- In order to put the printing paper in the main body, push the buttons on the side of the front panel of the printer door and pull forward.



- When you pull the door forward, the door will open forward and you will see the area where you can place the print paper and printer machine, and also see the black roller built on the door side.



-

- Load the paper properly for the roller size with its print area upward and pull the start point of the paper to the front of the printer door. Close the printer door.

NOTE!
The paper’ s print area should be upward. Otherwise, information will not be recorded while the printer working.

Chapter 5

Description of the Main Body

INSIGHT Main Body H/W is composed of the parts as follow:

1) Main Board

2) Analogue Board

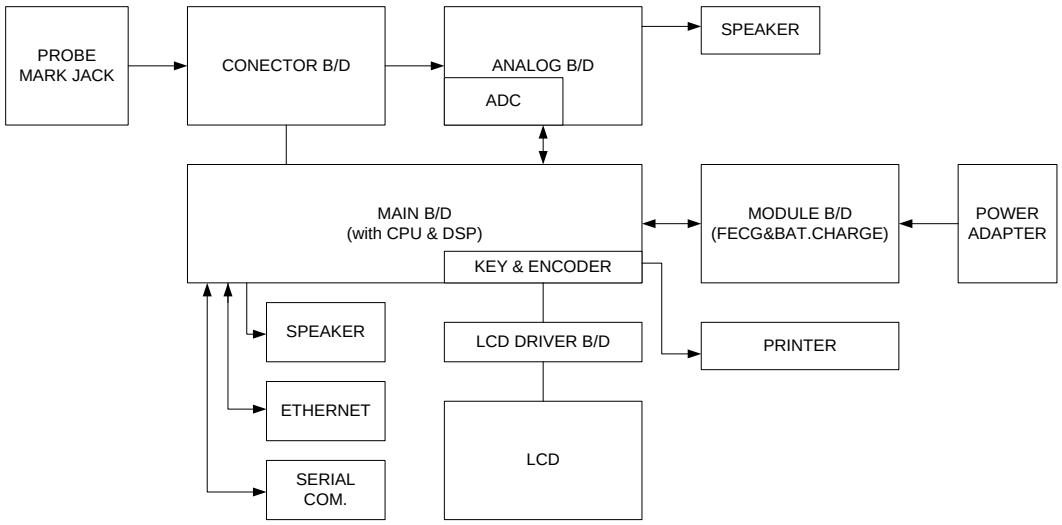
3) Module Board (FECG, Battery Charge)

4) LCD Driver

5) Connector Board

6) Probe B/D

The entire system's block diagram is as follows:

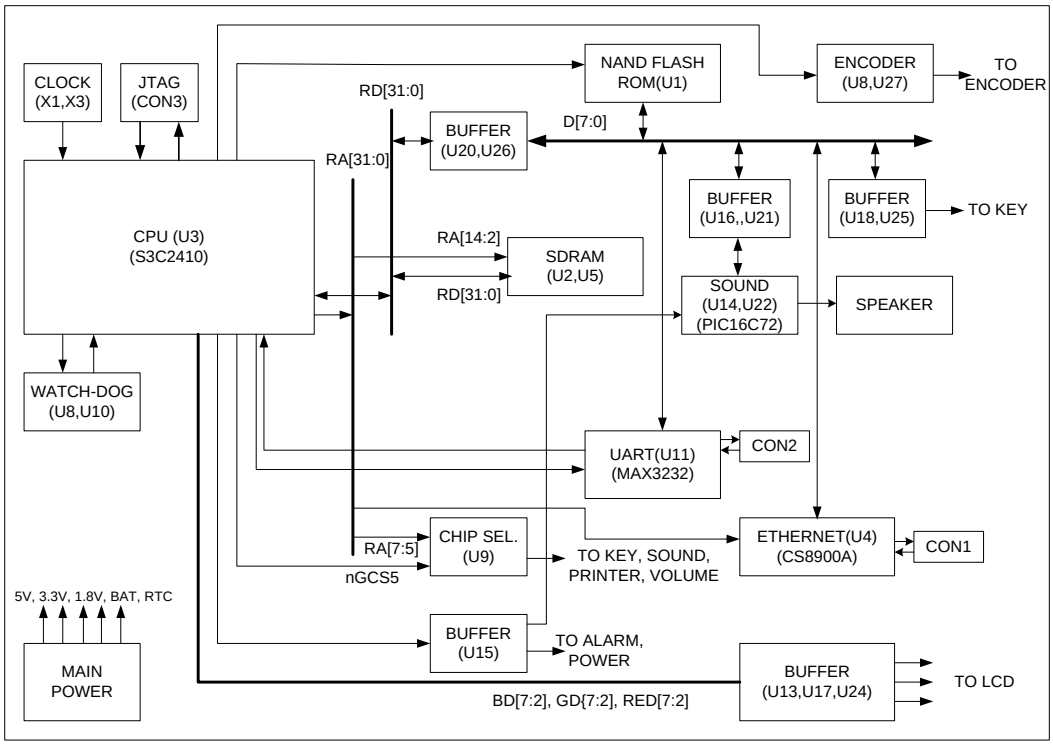


The main board works on the interface among the peripheral devices including LCD, sound, key, printer, Ethernet, serial communication and etc. The main board is designed to internally have DSP, which treats analogue signal coming in through input. The analogue board measures bio signals and converts them into digital data, which is delivered to the main board's DSP. The module board has FECG circuit and battery charge circuit. FECG circuit is insulated against Power and Signal and measures the fetus' electrocardiogram. The battery charge circuit receives the adapter's DC input to charge 6-CELL battery, and if AC Power is blocked, the device is operated by battery Power. LCD drive board consists of LCD control circuit and inverter circuit. The connector board is designed to support the

mark jack and LAN cable. Probe board measures the signal received from the sensor that directly measures the bio signals coming from the mother.

5.1 Main Board

The main board is divided CPU part and DSP part.



(Block Diagram of CPU part)

The CPU part of main B/D has CPU S3C2410 inside. CPU has ARM920T core inside. It is a chip designed for LCD Controller (640x480 Color TFT LCD), GPIO, RTC, NAND Controller, UART (RS-232C), USB, A/D converter and IIC/SPI communication. INSIGHT CPU speed is 200MHz.

SDRAM consists of 64Mbyte and NAND FLASH of 32Mbyte. NAND FLASH memory is used to save the parameter value set in the device and 24-hour trend data. Boot-load and application programs are downloaded here.

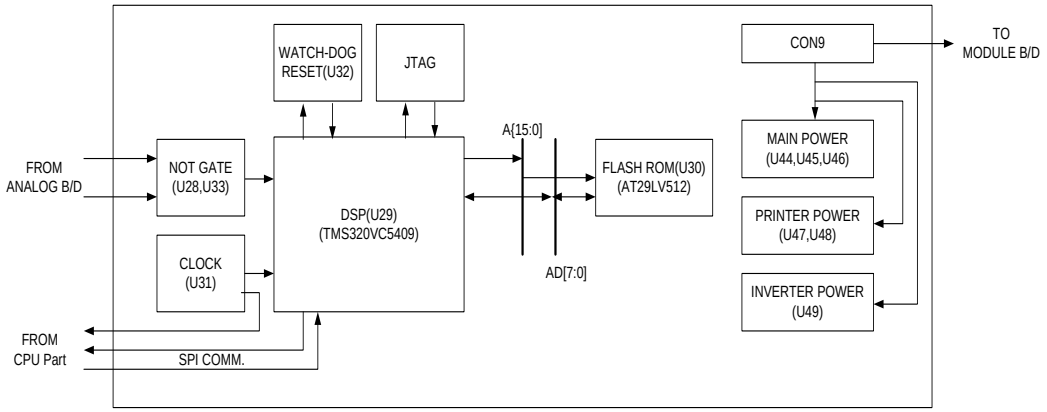
Max3232 and 16C554 communication chips are used for external peripheral devices and interface through Serial communication. For INSIGHT, they are linked with PC.

Ethernet chip (CS8900A) is for Ethernet communication and used for the central monitor. It is used also to download application programs updated with serial communication.

The DSP part of main B/D has DSP (TMS320VC5409) inside. This board receives the signal measured from analogue and treats signal. The treated signal result is delivered to the CPU.

The clock for DSP is 16MHz. The analogue data is acquired through the interface between PIC16C711 (U28) controller and A/D converter.

Probe ID is read directly at DSP porter to check whether Probe is attached or not.

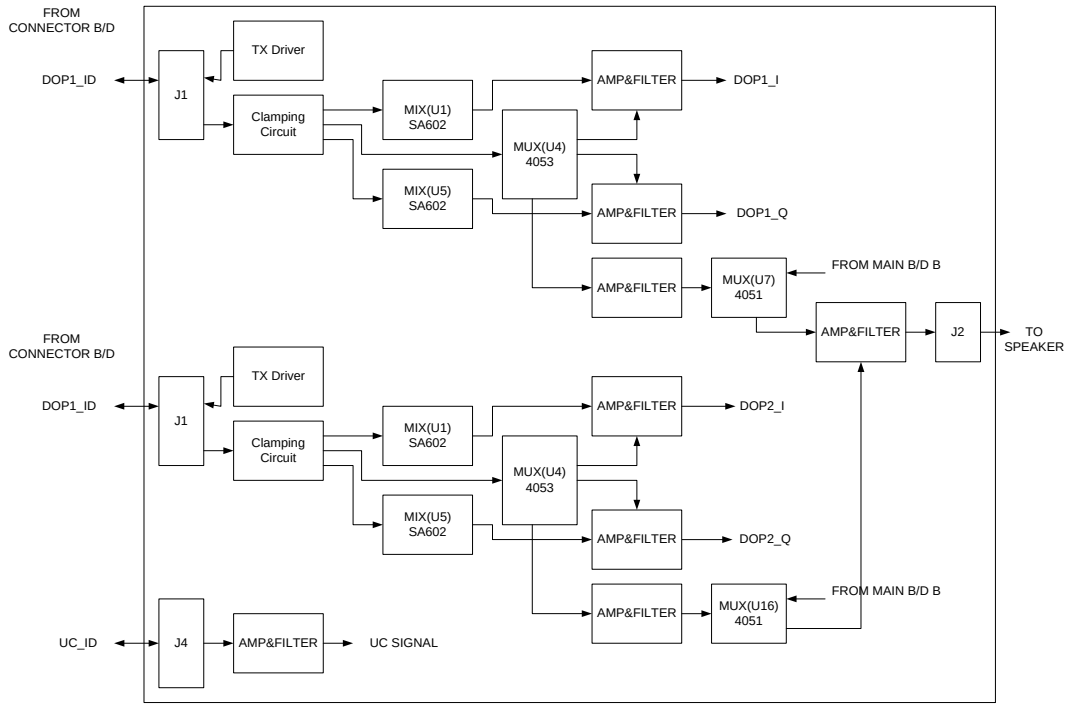


(Block Diagram of DSP part)

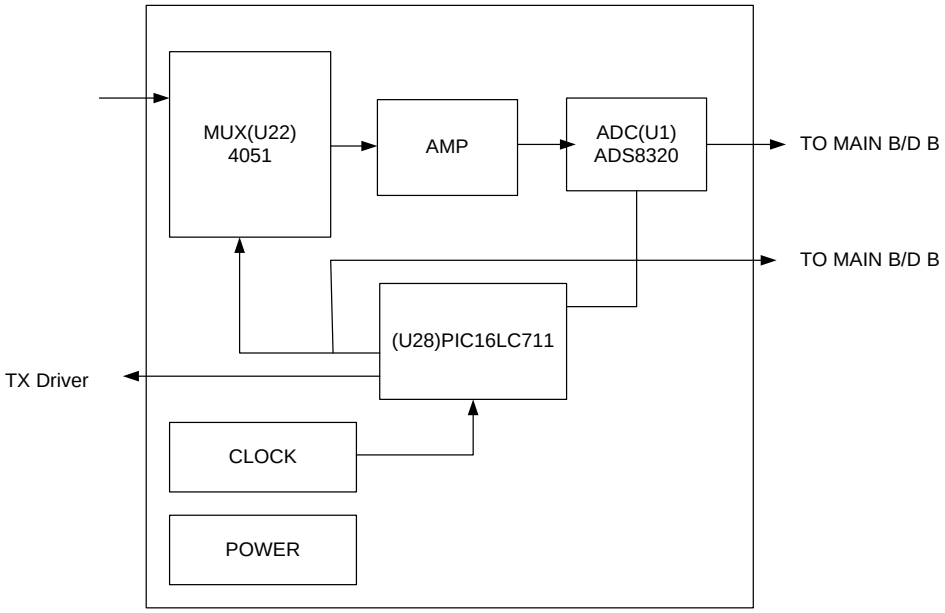
The interface of DSP and CPU is to execute SPI communication. The clock for DSP is 16MHz.

5.2 Analogue Board

This separates/multiplies/filters/demodulates the bio signal measured through Probe (DOP1, DOP2 and UC). It outputs Doppler sound through speaker. In addition, it outputs the clock to generate 2MHz ultrasonic wave on each Probe.



Each analogue signal is input into A/D converter by the output timing of analogue multiplexer and PIC16C711.



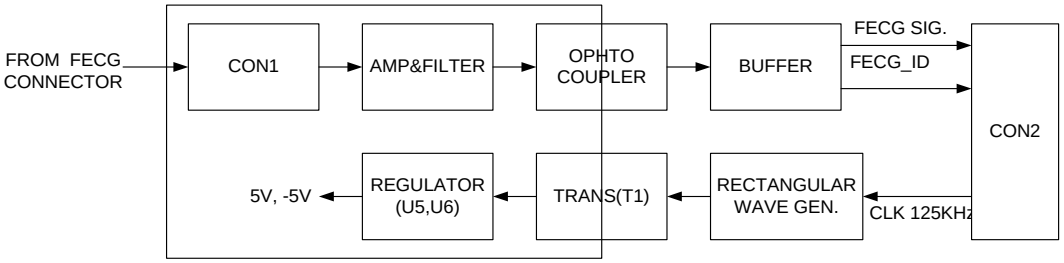
PIC16C711 micro controller divides 16MHz clock received from DSP to operate at 4MHz. This micro controller works on:

- A/D Convertor Control Signal Generation
- Analog Control Address Generation
- Tx, Rx Gate Signal Generation
- Demodulation Carrier Generation
- DSP Interface Sync Generation

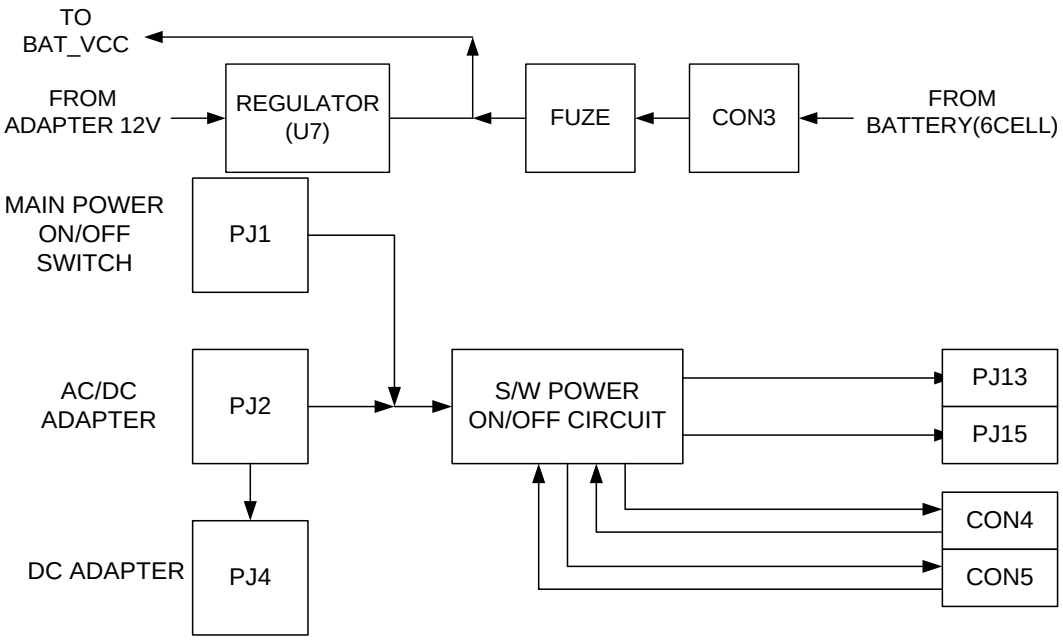
5.4 MODULE B/D

This is composed of FECG circuit that measures the fetus' electrocardiogram and the other circuit that charges the battery. FECG circuit is insulated against power and signal. The final result will be delivered to the main board B.

6 CELL battery is used for INSIGHT. It lasts 2 hours after charged for 12 hours.



<FECG Circuit>



<Battery Charge Circuit>

This is connected with AC power switch of the probe connection terminal located externally on the left side of INSIGHT Probe. It is also connected with the front panel S/W DC Power Switch. This connection is made to turn off the device power by program.

5.4 Connector Board

This has a mark jack and a connection terminal for Ethernet communication.

5.5 Probe B/D

INSIGHT has 3 kinds of Probe, which are DOP1, DOP2, UC Probe and AST Probe (optional). DOP1 and DOP2 are mounted with 9 ultrasonic sensors for liquid.

UC Probe has a piezoelectric Sensor, which helps measuring the electric signal generated when the mother's womb is relaxed and shrunken.

AST Probe has the speaker. It makes the baby wake up.

Chapter 6

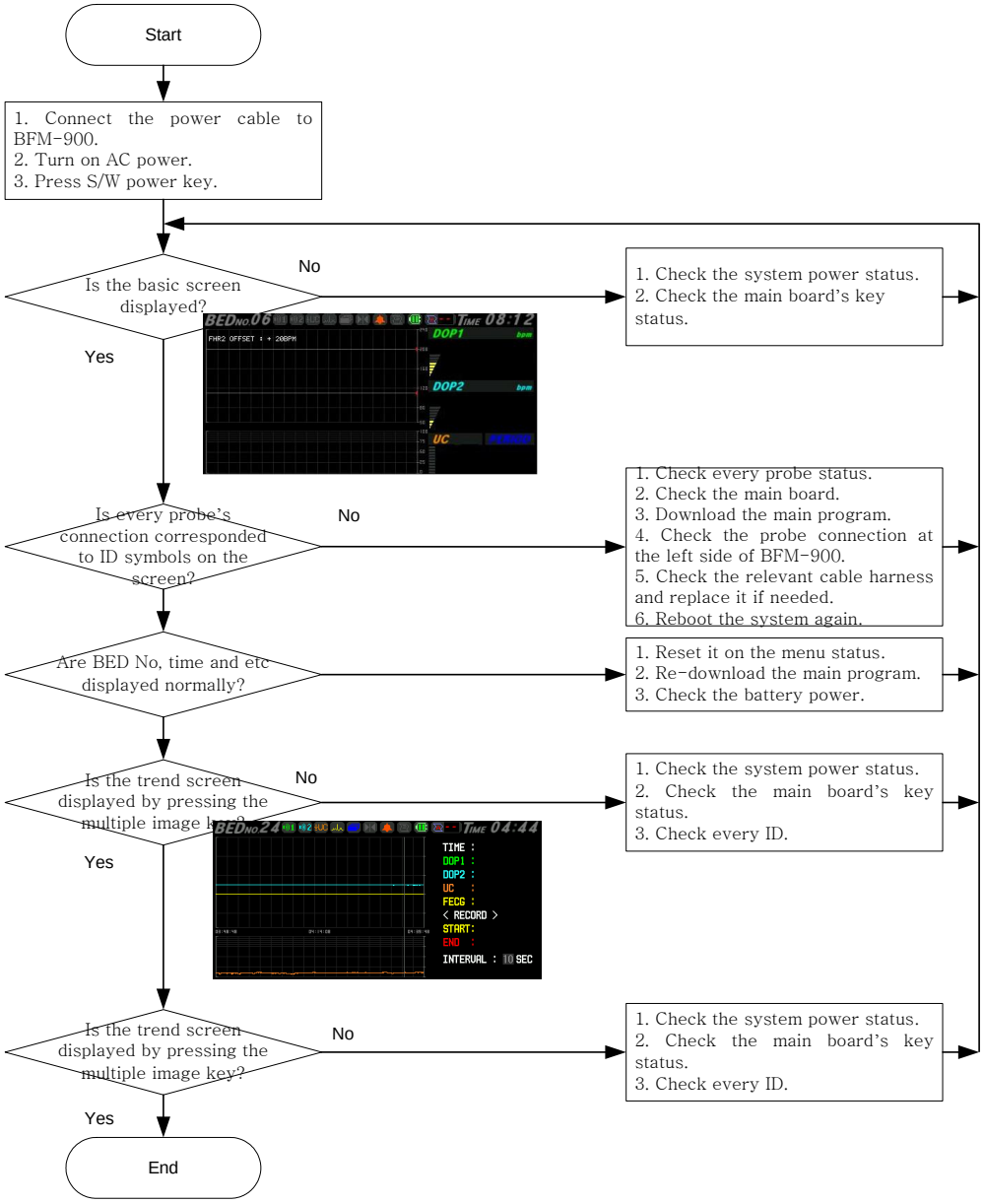
Troubleshooting

6.1 Troubleshooting List

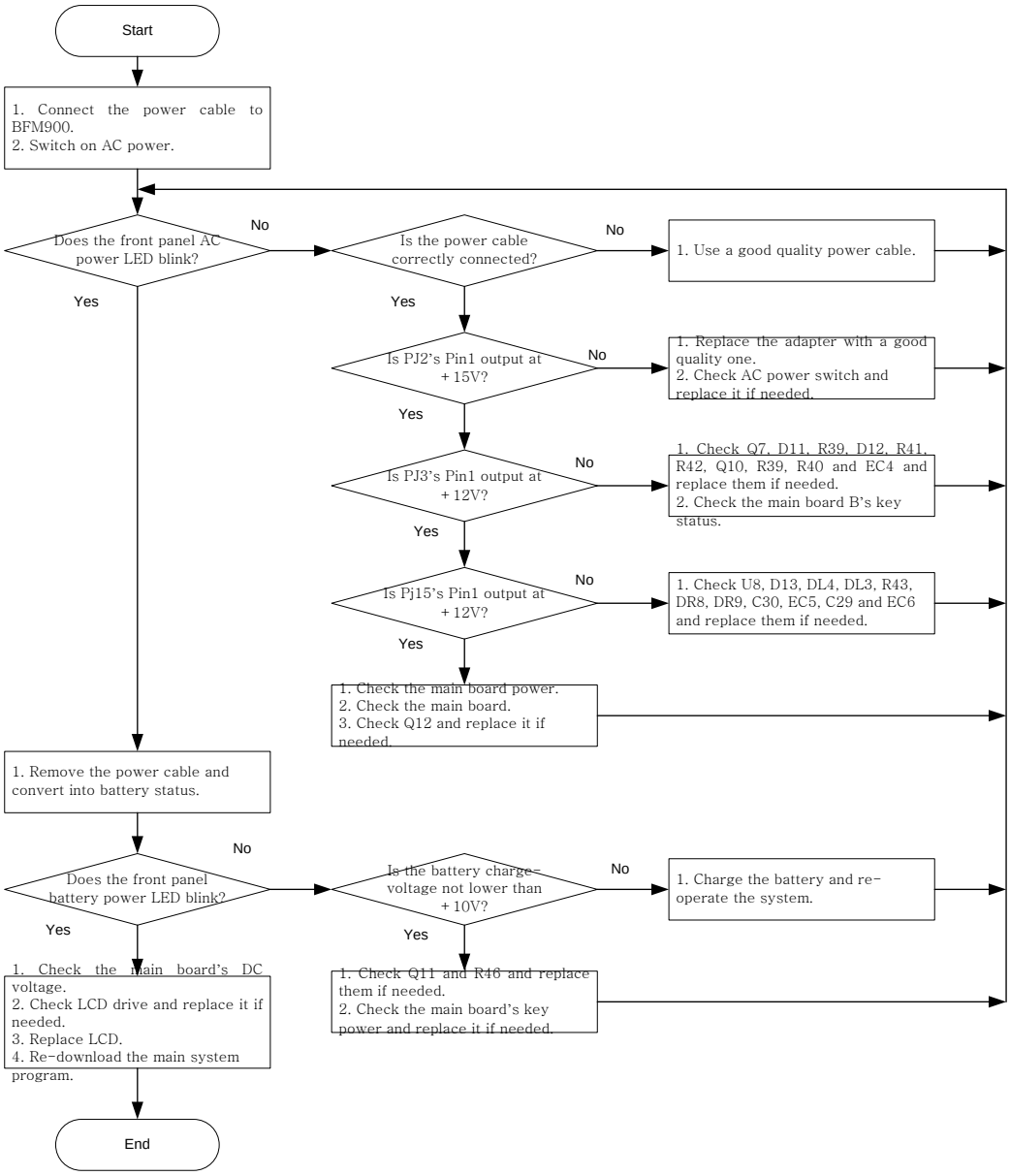
NO	Troubles
1	Basic Screen Not Displayed
2	Power Error
3	Trouble on Main Board
4	Trouble on LCD Driver
5	Trouble on Probe ID
6	Trouble on Sound
7	Trouble on Print
8	Trouble on DOP 1
9	Trouble on DOP 2
10	Trouble on UC
11	Trouble on FECG
12	Trouble on Battery

6.2 Actions to Take on:

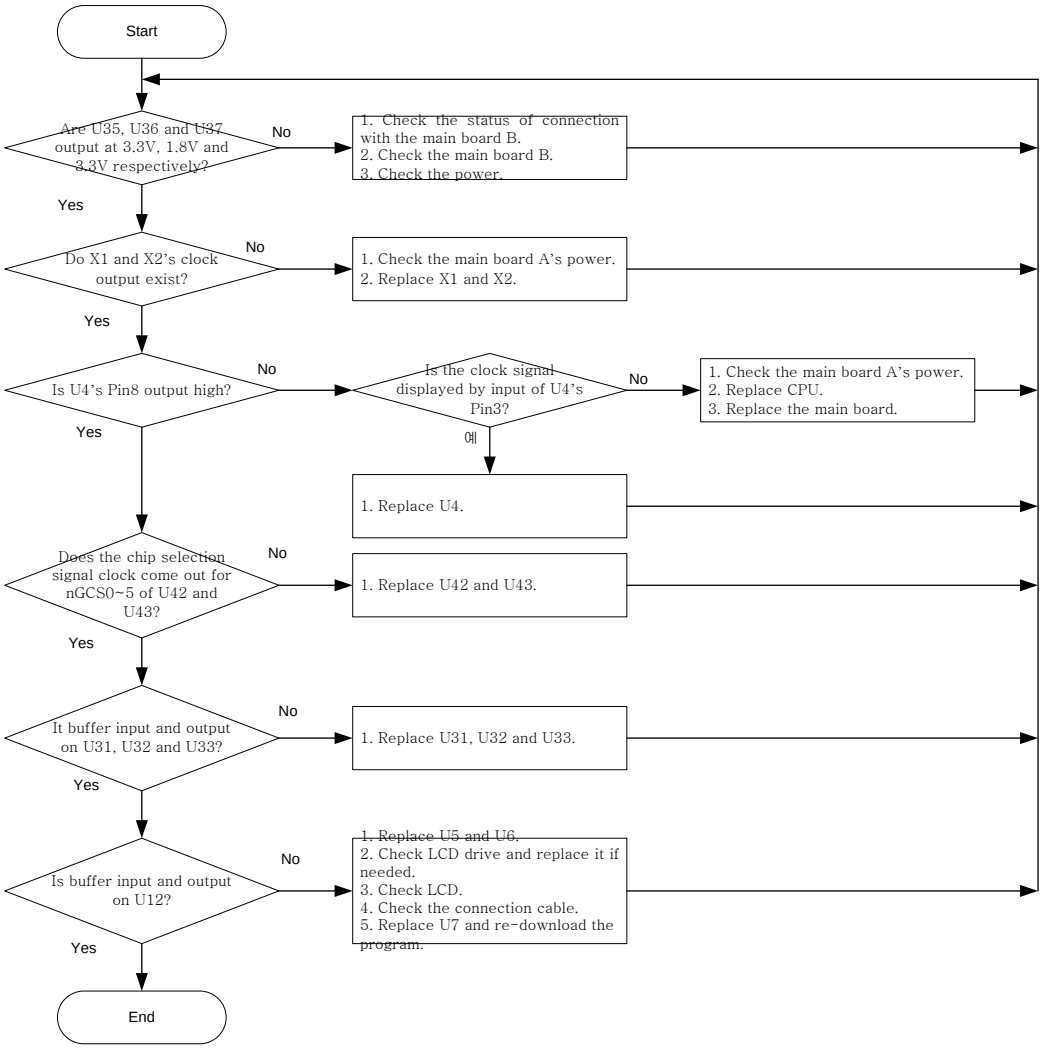
1. Basic Screen Not Displayed

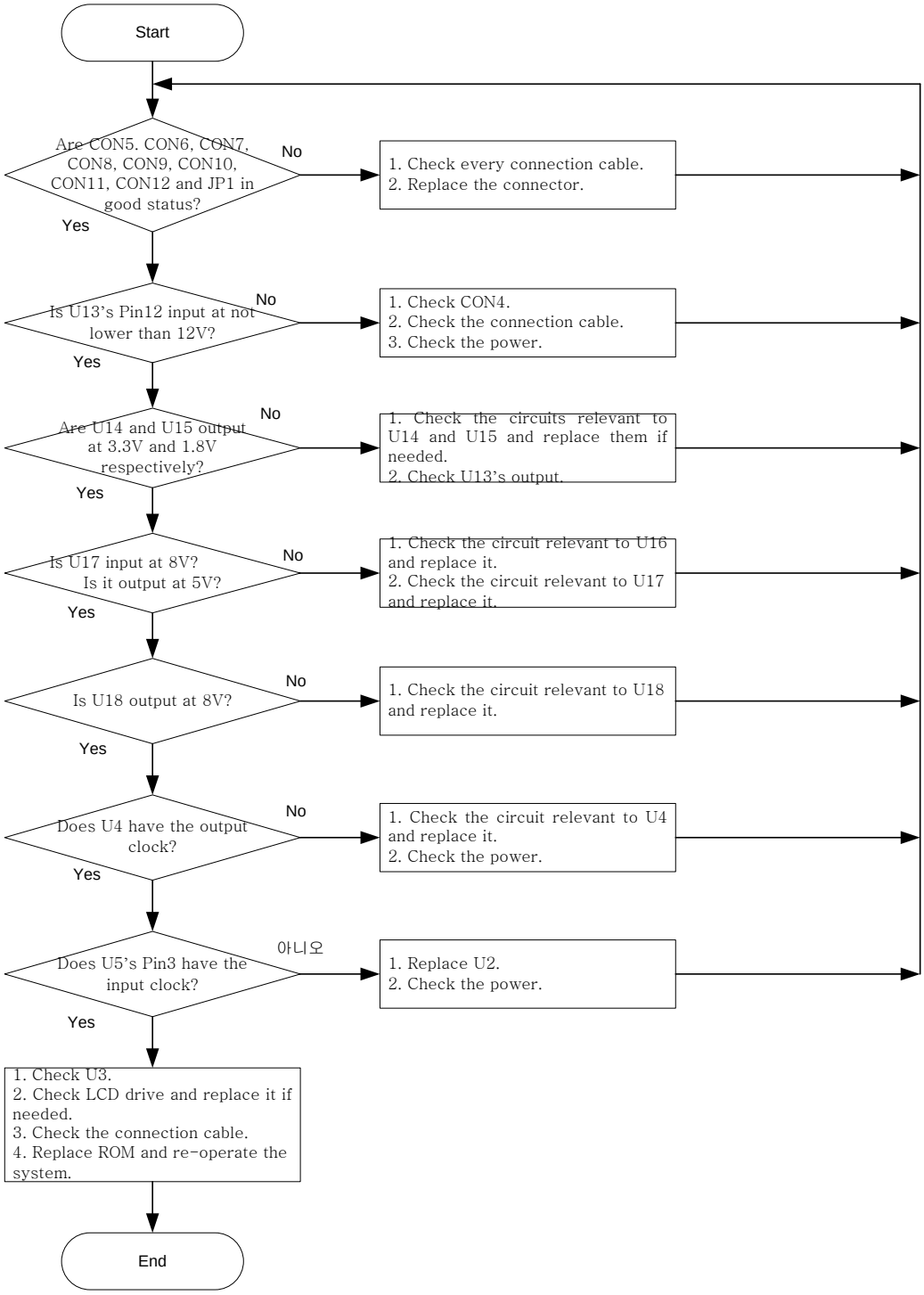

Start
1. Connect the power cable to BFM-900.
2. Turn on AC power.
3. Press S/W power key.
Is the basic screen displayed?
No
1. Check the system power status.
2. Check the main board's key status.
Yes
Is every probe's connection corresponded to ID symbols on the screen?
No
1. Check every probe status.
2. Check the main board.
3. Download the main program.
4. Check the probe connection at the left side of BFM-900.
5. Check the relevant cable harness and replace it if needed.
6. Reboot the system again.
Are BED No, time and etc displayed normally?
1. Reset it on the menu status.
2. Re-download the main program.
3. Check the battery power.
Is the trend screen displayed by pressing the multiple image key?
No
1. Check the system power status.
2. Check the main board's key status.
3. Check every ID.
Yes
Is the trend screen displayed by pressing the multiple image key?
No
1. Check the system power status.
2. Check the main board's key status.
3. Check every ID.
Yes
End

2. Power Error

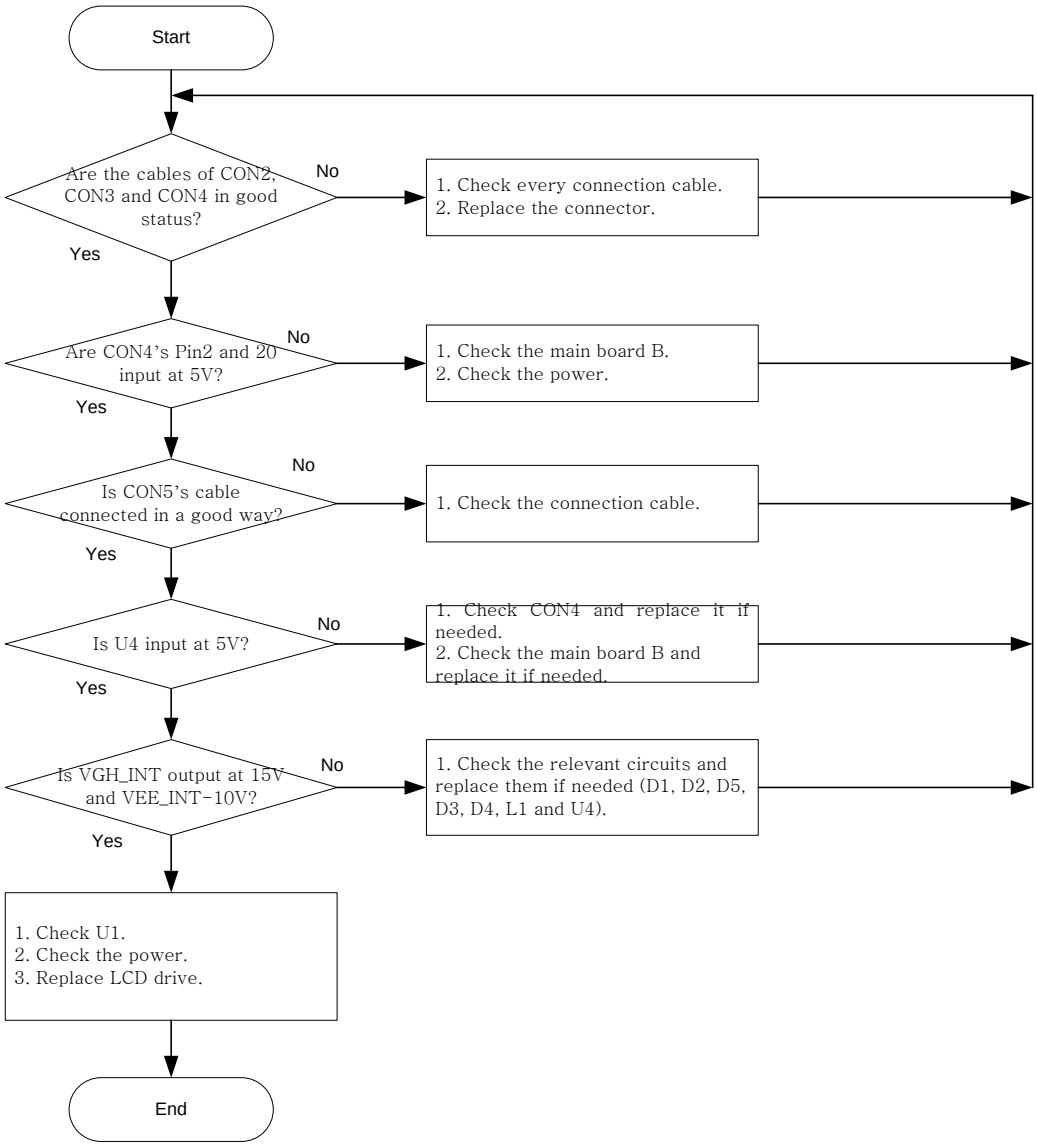

Start
1. Connect the power cable to BFM900.
2. Switch on AC power.
Does the front panel AC power LED blink?
No
Yes
Is the power cable correctly connected?
No
1. Use a good quality power cable.
Yes
Is PJ2's Pin1 output at +15V?
No
1. Replace the adapter with a good quality one.
2. Check AC power switch and replace it if needed.
Yes
Is PJ3's Pin1 output at +12V?
No
1. Check Q7, D11, R39, D12, R41, R42, Q10, R39, R40 and EC4 and replace them if needed.
2. Check the main board B's key status.
Yes
Is Pj15's Pin1 output at +12V?
No
1. Check U8, D13, DL4, DL3, R43, DR8, DR9, C30, EC5, C29 and EC6 and replace them if needed.
Yes
1. Check the main board power.
2. Check the main board.
3. Check Q12 and replace it if needed.
1. Remove the power cable and convert into battery status.
Does the front panel battery power LED blink?
No
Yes
Is the battery charge-voltage not lower than +10V?
No
1. Charge the battery and re-operate the system.
Yes
1. Check the main board's DC voltage.
2. Check LCD drive and replace it if needed.
3. Replace LCD.
4. Re-download the main system program.
1. Check Q11 and R46 and replace them if needed.
2. Check the main board's key power and replace it if needed.
End

3. Trouble on Main Board

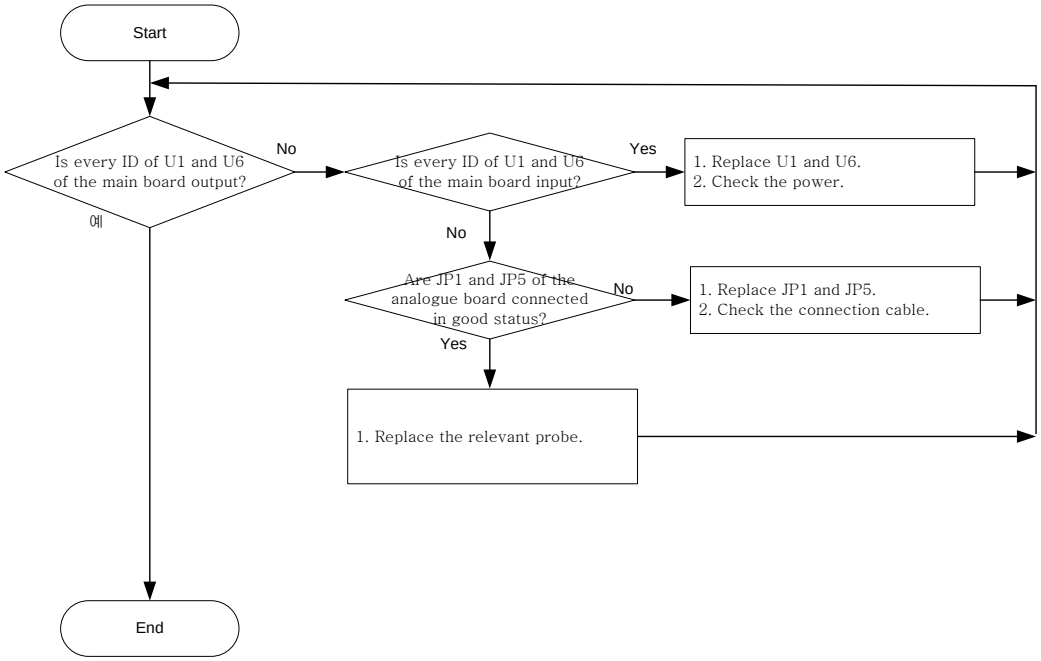

Start
Are U35, U36 and U37 output at 3.3V, 1.8V and 3.3V respectively?
No
1. Check the status of connection with the main board B.
2. Check the main board B.
3. Check the power.
Yes
Do X1 and X2's clock output exist?
No
1. Check the main board A's power.
2. Replace X1 and X2.
Yes
Is U4's Pin8 output high?
No
Is the clock signal displayed by input of U4's Pin3?
No
1. Check the main board A's power.
2. Replace CPU.
3. Replace the main board.
Yes
예
1. Replace U4.
Does the chip selection signal clock come out for nGCS0~5 of U42 and U43?
No
1. Replace U42 and U43.
Yes
It buffer input and output on U31, U32 and U33?
No
1. Replace U31, U32 and U33.
Yes
Is buffer input and output on U12?
No
1. Replace U5 and U6.
2. Check LCD drive and replace it if needed.
3. Check LCD.
4. Check the connection cable.
5. Replace U7 and re-download the program.
Yes
End


Start
Are CON5, CON6, CON7, CON8, CON9, CON10, CON11, CON12 and JP1 in good status?
No
1. Check every connection cable.
2. Replace the connector.
Yes
Is U13's Pin12 input at not lower than 12V?
No
1. Check CON4.
2. Check the connection cable.
3. Check the power.
Yes
Are U14 and U15 output at 3.3V and 1.8V respectively?
No
1. Check the circuits relevant to U14 and U15 and replace them if needed.
2. Check U13's output.
Yes
Is U17 input at 8V? Is it output at 5V?
No
1. Check the circuit relevant to U16 and replace it.
2. Check the circuit relevant to U17 and replace it.
Yes
Is U18 output at 8V?
No
1. Check the circuit relevant to U18 and replace it.
Yes
Does U4 have the output clock?
No
1. Check the circuit relevant to U4 and replace it.
2. Check the power.
Yes
Does U5's Pin3 have the input clock?
아니오
1. Replace U2.
2. Check the power.
Yes
1. Check U3.
2. Check LCD drive and replace it if needed.
3. Check the connection cable.
4. Replace ROM and re-operate the system.
End

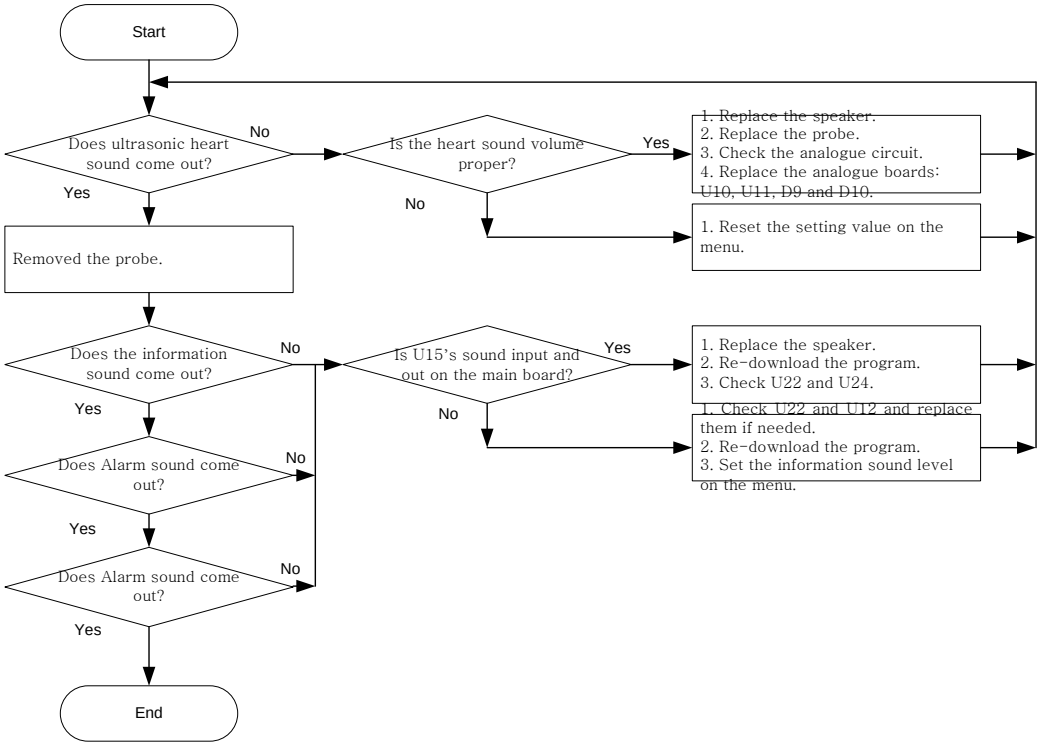
4. Trouble on LCD Driver


Start
Are the cables of CON2, CON3 and CON4 in good status?
No
1. Check every connection cable.
2. Replace the connector.
Yes
Are CON4's Pin2 and 20 input at 5V?
No
1. Check the main board B.
2. Check the power.
Yes
Is CON5's cable connected in a good way?
No
1. Check the connection cable.
Yes
Is U4 input at 5V?
No
1. Check CON4 and replace it if needed.
2. Check the main board B and replace it if needed.
Yes
Is VGH_INT output at 15V and VEE_INT-10V?
No
1. Check the relevant circuits and replace them if needed (D1, D2, D5, D3, D4, L1 and U4).
Yes
1. Check U1.
2. Check the power.
3. Replace LCD drive.
End

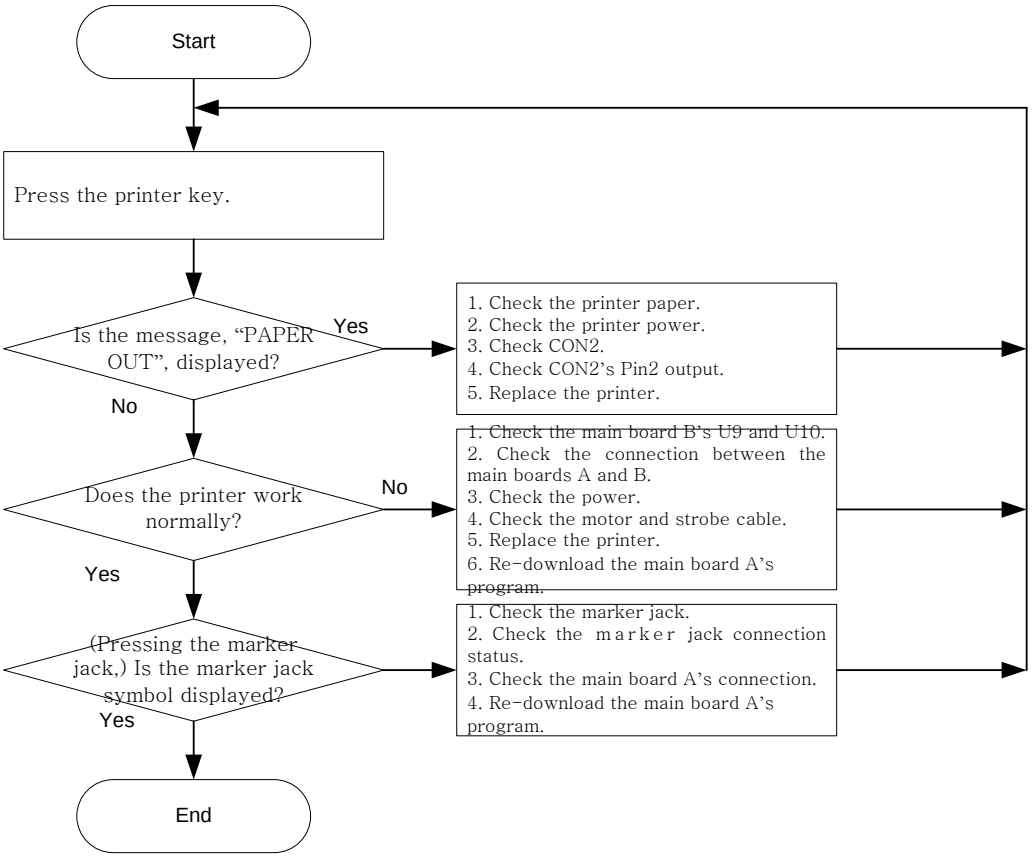
5. Trouble on Probe ID


Start
Is every ID of U1 and U6 of the main board output?
No
Is every ID of U1 and U6 of the main board input?
Yes
1. Replace U1 and U6.
2. Check the power.
No
Are JP1 and JP5 of the analogue board connected in good status?
No
1. Replace JP1 and JP5.
2. Check the connection cable.
Yes
1. Replace the relevant probe.
예
End

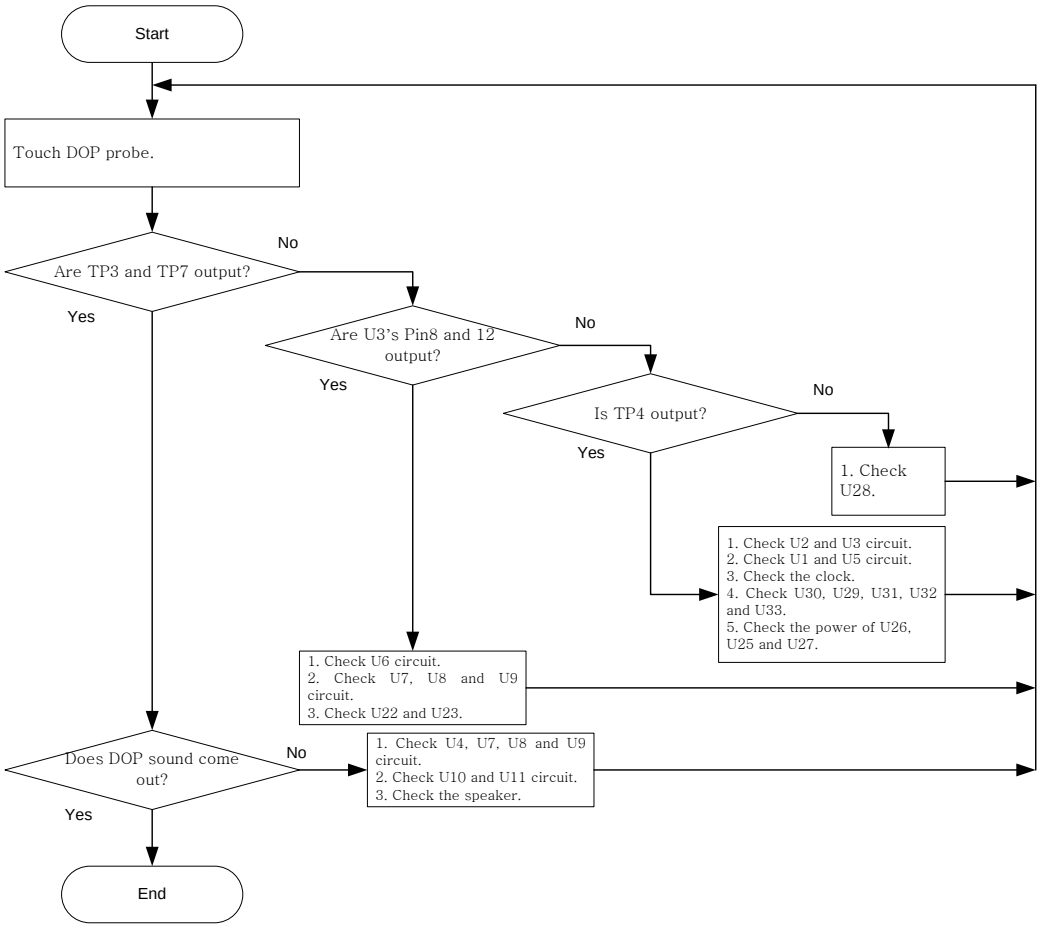
6. Trouble on Sound



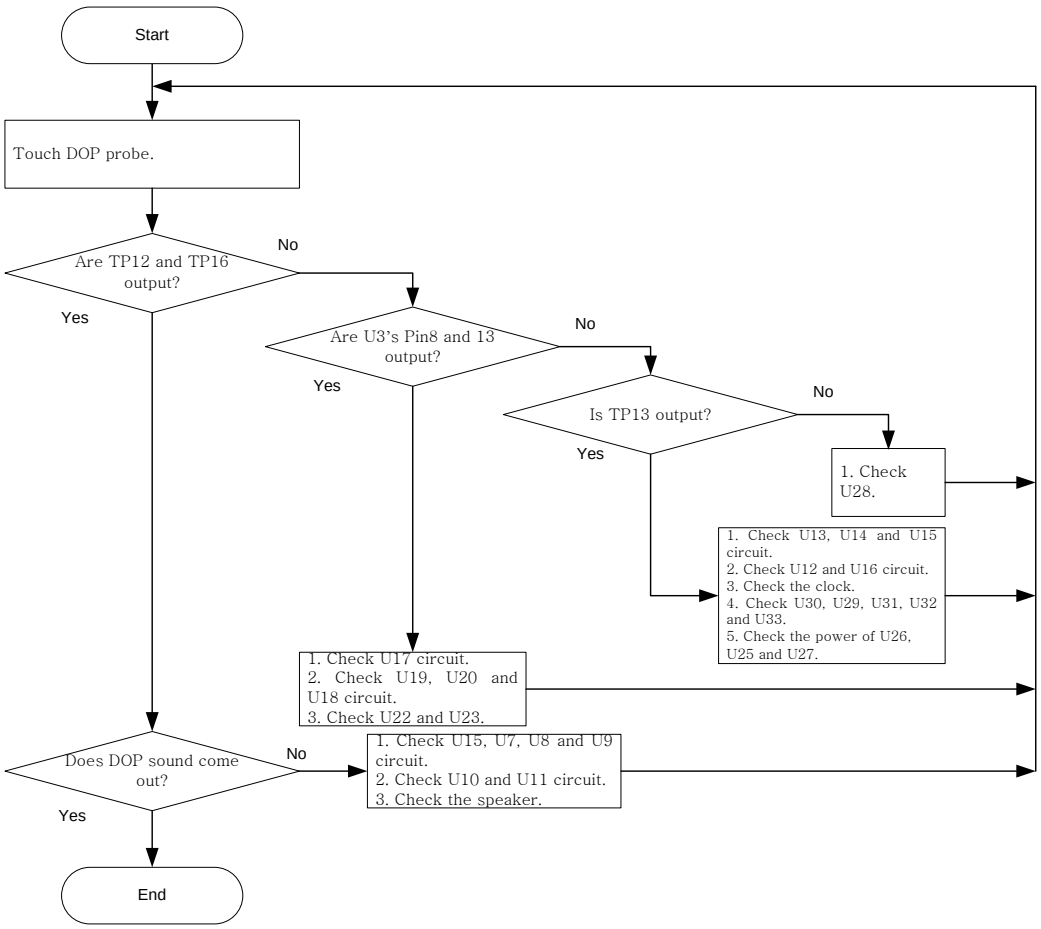
7. Trouble on Print


Start
Press the printer key.
Is the message, “PAPER OUT”, displayed?
Yes
No
1. Check the printer paper.
2. Check the printer power.
3. Check CON2.
4. Check CON2’s Pin2 output.
5. Replace the printer.
Does the printer work normally?
No
Yes
1. Check the main board B’s U9 and U10.
2. Check the connection between the main boards A and B.
3. Check the power.
4. Check the motor and strobe cable.
5. Replace the printer.
6. Re-download the main board A’s program.
(Pressing the marker jack,) Is the marker jack symbol displayed?
Yes
1. Check the marker jack.
2. Check the marker jack connection status.
3. Check the main board A’s connection.
4. Re-download the main board A’s program.
End

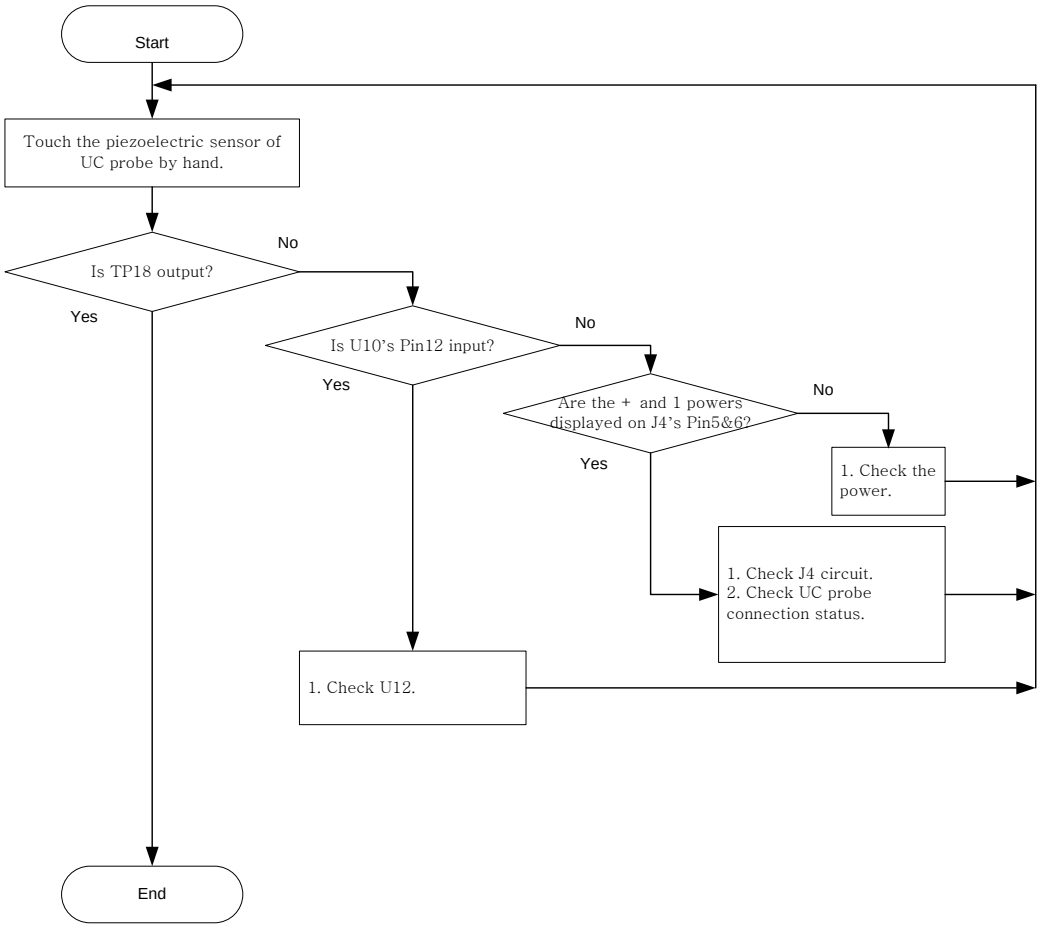
8. Trouble on DOP 1



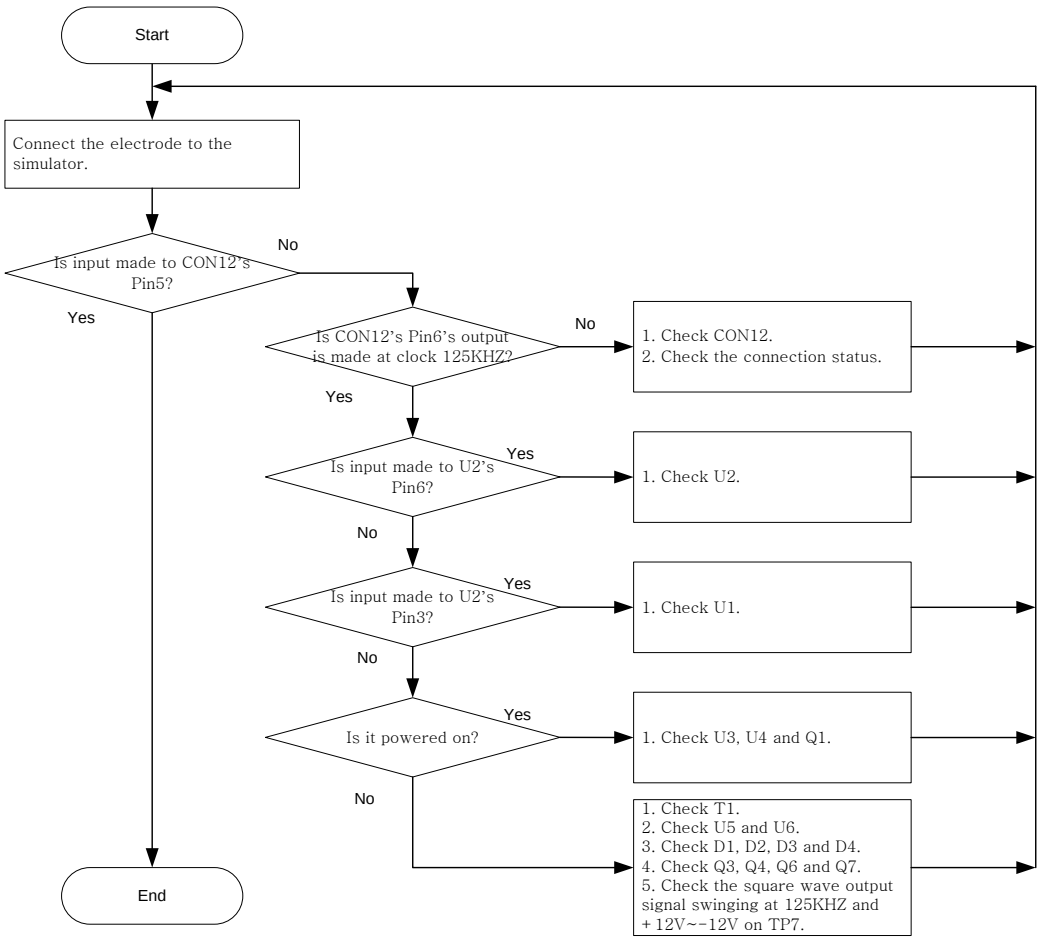
9. Trouble on DOP 2



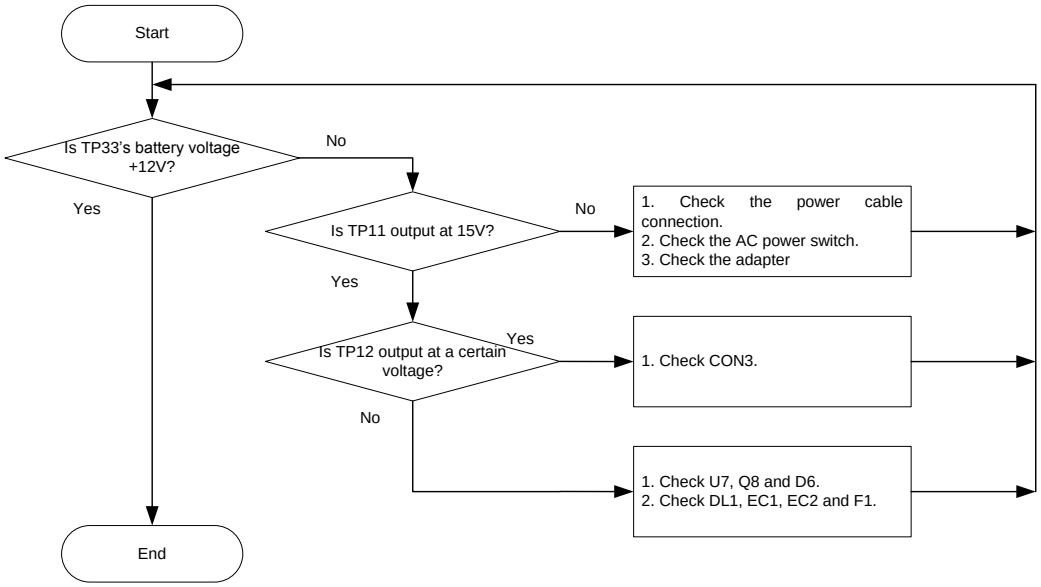
10. Trouble on UC



11. Trouble on FECG



12. Trouble on Battery



Chapter 7

Specification

- **Mechanical**

Base Unit Size : 180mm(W) x 248 mm(H) x 175 mm(D)
Weight : less than 3.7Kg (with paper)

- **Monitor Environmental Specifications**

Temperature Range
Operating : 10 to 45℃
Storage : -10 to 50℃
Relative Humidity Range
Operating : 30 ~ 85%
Storage : 20 ~ 95%
Atmospheric Pressure Range
Operating : 70 ~ 106kPa
Storage : 70 ~ 106kPa

- **Power Specifications**

Power Requirements : 100 - 240VAC, 50/60Hz, about 80VA
Power Fail Protection
Battery Specifications :,Sealed Rechargeable Battery (11.1V 4.4Ah, Li-ion Battery)
Operation Time : about 2 hours
Charge Time (after connection to AC power) : about 12 hours

- **Monitor Performance Specifications**

≫Doppler
Pulsed Doppler
Ultrasound Frequency : 2.0 MHz
Intensity : <10mW/cm^2
FHR Range : 50 ~ 240 bpm
FHR Accuracy : ±2% of range
Dual Doppler
Dual Fetal Movement Detection
≫UC
External Type
Frequency Response : DC ~ 0.5 Hz
Reference(Zero) Control
Measurement Range : 0 ~ 99 units
≫FECG
FHR range : 50 ~ 240 bpm
Input Impedance : >10 M ohm
Input Circuit Current : Less than 40uA
Baseline Recovery Time : Less than 5 seconds
Input Signal Range : ±5mVpeak(DC offset : ±300mVpeak)
Bandwidth : 0.5 to 35Hz

≫Printer
Thermal Array Type
Print Speed : 1,2,3 cm/min
Print Contrast : 1,2,3 steps
Auto Print Period : 10,20,30,40,50,60,off min
FHR Print Area Zoom Function
FHR 2 Offset Function
FM On/Off Function
ROLL Type Paper
≫LCD
7 inch Wide Graphic Color LCD
Resolution : 480 X 234 pixels
LED Backlight
≫Indicators
Battery On (green LED)
AC Power (green LED)
≫Display
Bed Number
Probe IDs
Multi Screen State
Freeze State
Alarm On/Off State
Printing State
Auto period of a printer
AC State & Low Battery State
Time
Heart Rhythm
Operation Channel
Volume State
FHR1(DOP1) Value & Wave
FHR2(DOP2, FECG) Value & Wave
UC Value, Bar & Wave
UC Period
Mark Sign
24hr Trend Wave
≫Sound
Doppler Sound with Volume Control
FECG beep sound with Volume Control
Information Sound
Alarms Sound

External Link
≫Ethernet & RS-232 port

Standard Accessories

-	Ultrasound Doppler Probe	1 ea
-	UC Probe	1 ea
-	Event Marker Jack	1 ea
-	Print Paper	1 ea
-	Power cord	1 ea

- Ultrasound Gel 1 set
- Probe Belt 3 ea
- Operation Manual 1 ea

Optional Accessories

- FECG Probe
- Cart
- LAN CABLE & Program
- AST Probe

Fetal Monitor

Insight

Service Manual

MEDICAL ECONET GMBH